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10/712,112	11/13/2003	George H. Corrigan	10010484-2	7670

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EXAMINER

NGUYEN, LAM S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

CA

**Office Action Summary****Application No.**

10/712,112

**Applicant(s)**

CORRIGAN, GEORGE H.

**Examiner**

LAM S NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 November 2004.  
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7, 16-21 and 24 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☒ Claim(s) 4 and 6 is/are allowed.  
 6) ☒ Claim(s) 1-3, 5, 7, 16-21 and 24 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☐ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.  
 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date \_\_\_\_\_.  
 5) ☐ Notice of Informal Patent Application (PTO-152)  
 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Terminal Disclaimer*

The terminal disclaimer filed on 09/02/2004 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US 6729707 has been reviewed and is accepted. The terminal disclaimer has been recorded. Therefore, the non-statutory type double patenting rejections have been withdrawn.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 5, 7, 16, 18-21, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohorquez (US 5357081) in view of Suzuki (US 4514737) and Doluca (US 6208127).

Bohorquez discloses a fluid ejection device comprising:

- an internal power supply path (*FIG. 3: The power line with the resistor Rp*);
- a power regulator or a power delivery control loop (*FIG. 3, element 20*) providing an offset voltage (*FIG. 3: The voltage at the positive input of element 16*) from a feedback voltage;
- a group of nozzles (*column 1, lines 25-35*);
- a corresponding group of firing resistors (*FIG. 3, element RH and column 1, lines 25-35*);
- a corresponding group of switches (*FIG. 3, element 18*) controllable to

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couple a selected firing resistor (*FIG. 3, element RH*) of the group of firing resistors between the internal power supply path and the offset voltage to thereby permit electrical current to pass through the selected firing resistor (*FIG. 3 and column 1, lines 25-35*).

Bohorquez does not disclose wherein the power regulator provides the offset voltage *from the internal power supply path voltage*. In other words, Bohorquez does not disclose wherein the power regulator directly connects to the internal power supply path.

Suzuki discloses a printing head driving apparatus for driving printing elements such as a coil in an impact printer (*FIG. 9-10, element 14b*) or a heating resistor in a thermal printer (*FIG. 13, element 41 and column 7, lines 25-31*). The apparatus has an internal power supply path (*FIG. 9-10, element Vcc*) and a power regulator (*FIG. 9-10, elements 29-30 or 32-33*) directly connecting to the internal power supply path *Vcc* for sensing the variation of the power supply to provide a signal for controlling the driving of printing elements in accordance to variations in the power source voltage (*FIG. 9-10: The voltage at the input of the op-amp 31*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the power regulator disclosed by Bohorquez such as the power regulator provides the offset voltage from the internal power supply path voltage or directly connects to the internal power supply path as disclosed by Suzuki. The motivation of doing so is to drive the printing elements in accordance to variations in the power source voltage in order to gain printing quality as taught by Suzuki (*column 2, lines 36-45*).

In addition, Bohorquez does not disclose that the power regulator includes a digital-to-analog converter (DAC) coupled to the internal power supply path and configured to receive a digital offset command representing a desired offset voltage to provide an analog offset voltage

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from the internal power supply path (**Referring to claims 2, 20**), a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage wherein the self-calibration circuit includes a set point DAC up/down counter storing a set point offset voltage digital value which is provided as the digital offset command (**Referring to claims 7, 18-19, 21, 24**).

Doluca discloses a power regulator that includes a digital-to-analog converter (DAC) (*FIG. 3, element 330*) configured to receive a digital offset command (*FIG. 3, element 302*) representing a desired offset voltage to provide an analog offset voltage (*FIG. 3, element 332*) (**Referring to claims 2, 20**), a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage (*FIG. 3, elements 310, 300, and 320*) wherein the self-calibration circuit includes a set point DAC up/down counter (*FIG. 3, element 300*) storing a set point offset voltage digital value which is provided as the digital offset command (*FIG. 3, element 302*) (**Referring to claims 7, 18-19, 21, 24**).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the power regulator in the printing system disclosed by Bohorquez such as including a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage as disclosed by Doluca. The motivation of doing so is to obtain “programmable voltage regulators that are used to provide output voltages that can be set to provide the output voltage required” as taught by Doluca (*column 1, line 25-28*).

**Bohorquez also discloses the following claimed invention:**

**Referring to claim 3:** wherein the power regulator further includes a feedback amplifier (*FIG. 3, element 16*) having a first input coupled to an input offset voltage (*FIG. 3, element 16: The positive input*), a second input coupled to a feedback line (*FIG. 3, element 16: The negative input*), and a output coupled to a drive line (*FIG. 3, element 16: The output line*), wherein a selected switch (*FIG. 3, element 18*) corresponding to a selected firing resistor (*FIG. 3, element RH*) has a control gate (*FIG. 3, element 18*) controlled by the drive line, and an internal power ground (*FIG. 3, element Rr*), wherein the selected firing resistor of the group of firing resistor includes a first terminal coupled to the internal power supply (*FIG. 3, element RH: A terminal that is connected to Rp*) and a second terminal coupled to the feedback line and the switch (*FIG. 3, element RH: A terminal that is connected to the negative input of the amplifier 16 and the switch 18 through resistor R1*), wherein the drive line provides the offset voltage to the feedback line and the second terminal of the selected firing resistor through the selected switch (*FIG. 3*).

**Referring to claim 5:** an internal power ground (*FIG. 3, the power line with Rr is connected to the emitter of the switch 18*); wherein the first terminal of the selected firing resistor is coupled to the internal power supply path (*FIG. 3, element RH: A terminal that is connected to Rp*); and wherein the selected switch is coupled between the second terminal of the firing resistor and the internal power ground (*FIG. 3: The switch 18 is located between the firing resistor RH (through R1) and the ground Rr*).

2. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohorquez (US 5357081) in view of Suzuki (US 4514737) and Doluca (US 6208127) as applied to claim 16, and further in view of Otsuki (US 6145961).

Bohorquez, as modified, discloses the claimed invention as discussed above except wherein the at least one fluid ejection device includes multiple fluid ejection devices.

Otsuki discloses a fluid ejection device including multiple fluid ejection devices, wherein each ejection device ejects different color ink for color printing (*FIG. 6, elements 81-82*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing system disclosed by Bohorquez, as modified, such as including multiple fluid ejection devices for printing multiple colors as disclosed by Otsuki. The motivation of doing so is to provide a printing apparatus that is capable to print multiple colors as taught by Otsuki (*Abstract*).

***Allowable Subject Matter***

3. Claims 4 and 6 are allowed.

**Referring to claim 4:** The primary reasons for the indication of the allowability of the claim is the inclusions therein, in combination as currently claimed, of the limitation that wherein the self-calibration circuit includes a regulation detector configured to compare the offset voltage at the first input of the feedback amplifier and the offset voltage on the feedback line and provide an in regulation signal which is activated based on the power regulator being in regulation is neither disclosed nor taught by the cited prior art of record, alone or in combination.

**Referring to claim 6:** The primary reasons for the indication of the allowability of the claim is the inclusions therein, in combination as currently claimed, of the limitation that wherein the selected switch is coupled between the internal power supply path and the first terminal of the selected firing resistor is neither disclosed nor taught by the cited prior art of record, alone or in combination.

*Response to Arguments*

Applicant's arguments filed 11/10/2004 have been fully considered but they are not persuasive.

The applicants argued that Suzuki does not teach or suggest to couple or coupling “a selected firing resistor ... between the internal power supply path and the offset voltage” to thereby permit electrical current to pass through the selected firing resistor and whether there is any offset performed by the level shift circuit. However, as discussed above, Bohorquez' s FIG. 3 shows that transistor 18 couples the internal power supply path ( $R_p$ ) to the offset voltage (outputted from the amplifier 16) to pass the current through the firing resistor  $R_H$ . What Bohorquez lacks of is the direct connection between the power regulator and the internal power supply path. In Suzuki' s disclosure, the level shift circuit 29 and the microcomputer 31 (for directly sensing the variation of the voltage supply path  $V_{cc}$  to control the driving of printing elements) work as a power regulator that directly connects to the power supply path in order to sense the voltage variation of the power supply to output a control signal varying in accordance to the variation of the power supply voltage. Therefore, Suzuki' s teaching the direct connection between the power regulator and the internal power supply path compensates for the lacking of Bohorquez.

In addition, the applicants argued that Suzuki does not disclose a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage. However, as discussed above, the above lacking is taught or suggested by Doluca. As shown in FIG. 3, Doluca discloses a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage

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(*elements 310, 300, and 320*). Therefore, the applicants' argument does not consistent with the examiner's rejection.

Finally, the applicants argued that the examiner had failed to establish a motivation to combine the ink jet printhead of Bohorquez with the contact thermal printer of Suzuki. In this case, the sensing of variation of the power supply voltage by directly connecting the power regulator to the power supply path is applicable in both a thermal inkjet printhead or a contact thermal printhead without changing the operation or structure of the inkjet thermal printhead or the contact thermal printhead. Thus, one of ordinary skill in the art would have motivation to modify Bohorquez's power control circuit by directly connecting the power regulator to the power supply path as disclosed by Suzuki without changing or redesigning the structure of Bohorquez's printhead. Therefore, the applicants' argument is not persuasive.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (571)272-2151.

The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN  
January 26, 2005



HAI PHAM  
PRIMARY EXAMINER